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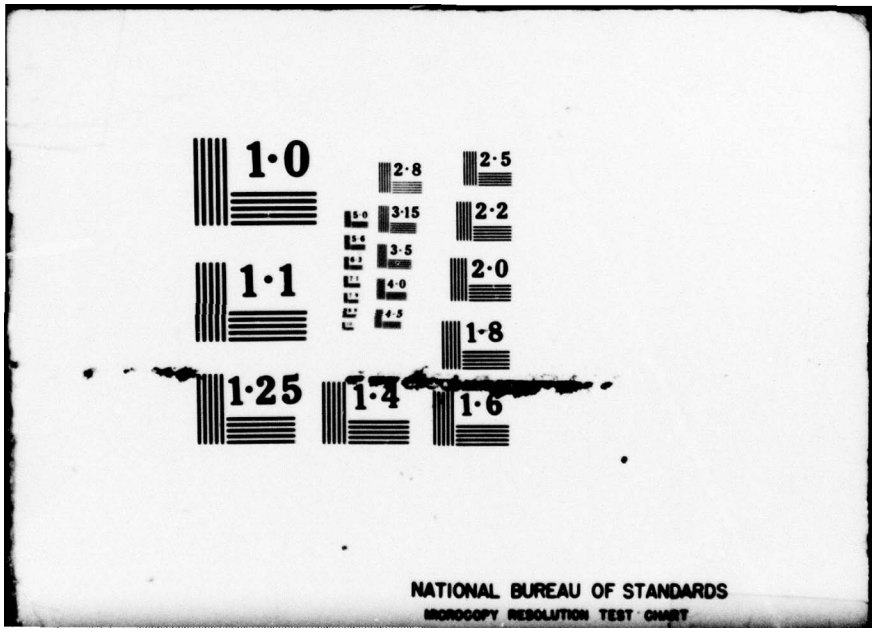
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(10) Daniel H. Casey

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SCOTT AIR FORCE BASE, ILLINOIS

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The Tactical Weather System (TWS) is a system of ten modules of mobile communications and meteorological equipment. The modules are divided into two components; the Tactical Weather Analysis Center (TWAC) and the Tactical Air Base Weather Element (TABWE). The TWAC receives weather information by HF radio and relays this information to the TABWE. The TABWE does not have its own HF intercept capability and could not perform its mission if deployed without the support of the TWAC. This report describes a prototype installation of HF radio equipment in the TABWE.

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weather data to the Tactical Air Force Headquarters and the TABWE. The TWAC has the capability to receive weather data from both wire line and radio sources. HF radio equipment is contained in the C Module.

The TABWE is deployed at the tactical air base adjacent to the Tactical Unit Operations Center. The TABWE provides weather data to the local tactical air base agencies and forwards weather observations to the TWAC. The TABWE has no HF radio intercept cability of its own. In some cases, the TWAC and TABWE may not be deployed as a system.

3. THE PROBLEM. The TWAC is normally deployed with the AFCH. The 3CMBTCG does not have an AFCH element and is not authorized the TWAC portion of the TWS. The TABWE has no equipment for receiving weather data sent by HF radio, but depends on information relayed from the TWAC. Without the support of the TWAC, the 3CMBTCG must deploy the antiquated AN/MSQ-10 Weather Intercept Van to provide weather data for the TABWE.

4. THE SOLUTION. The communications rack now contained in the TWAC is shown in Figure 1. It contains nine major items of equipment, which are identified in Table 3.

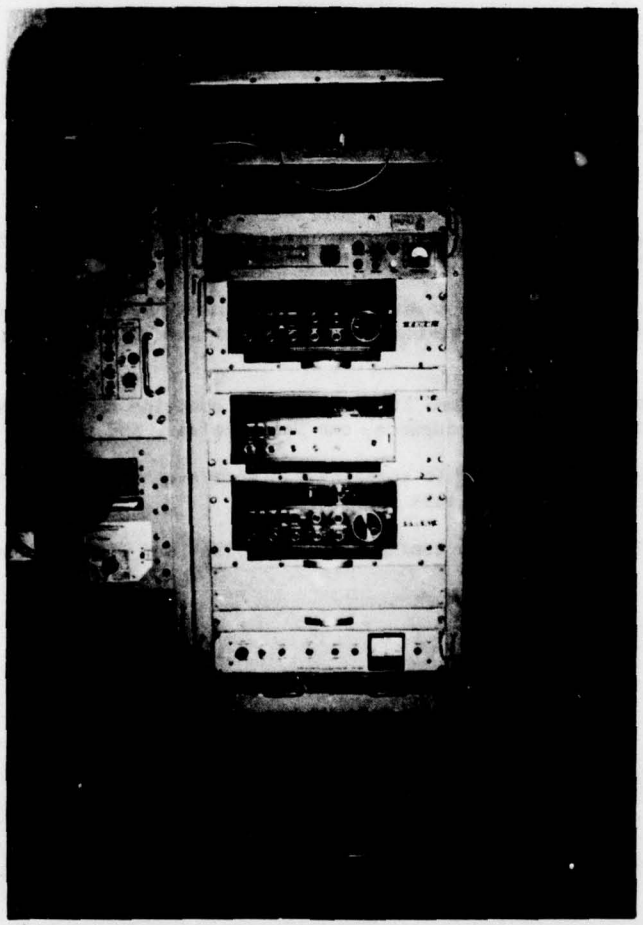

Figure 1. Communications Rack in TWAC

1. INTRODUCTION. This report describes the engineering and installation of a prototype high frequency (HF) radio receiving capability for the Tactical Air Base Weather Element (TABWE).

2. BACKGROUND. The Tactical Air Base Weather Element (TABWE) and Tactical Weather Analysis Center (TWAC) are configurations of mobile vans which comprise the Tactical Weather System (TWS), a system of communications and meteorological equipment. The nomenclature, function, and quantity of the various vans is shown in Table 1.

Table 1. Tactical Weather System (TWS) Van Description

Module	Nomenclature	Description/Function	Quantity
A	AN/TMQ-28	Meteorological Station/ Forecasting	3
B	AN/TCC-76	Communications Central/ Observing	2
C	AN/TCC-77	Communications Central/ Radio Intercept	1
D	S-517G	Maintenance Shelter	4

The A Module is the work area for the weather forecasters. No radio equipment is contained in the A Module, however the UHF radio in the B Module is operable from the A Module.

The B Module contains equipment to accept readouts from the various meteorological instruments. It contains a UHF transceiver, two facsimile recorders and two automatic send/receive teletype machines.

The C Module is the communications center of the TWS. It contains one send/receive teletype, two receive only printers, two facsimile recorders, one VHF receiver, and three HF receivers.

The D Module is the maintenance shop. It contains two work benches and two empty equipment racks with adjustable shelves for storage of test equipment.

The ten modules of the TWS are commonly configured into a TWAC and TABWE as shown in Table 2.

Table 2. TWAC and TABWE Module Arrangement

Module	TWAC	TABWE
A	2	1
B	1	1
C	1	0
D	2	2

The TWAC is deployed with the Air Force Component Headquarters (AFCH) and is located adjacent to the Tactical Air Control Center, and may be located as far as 100 miles from the TABWE. It provides

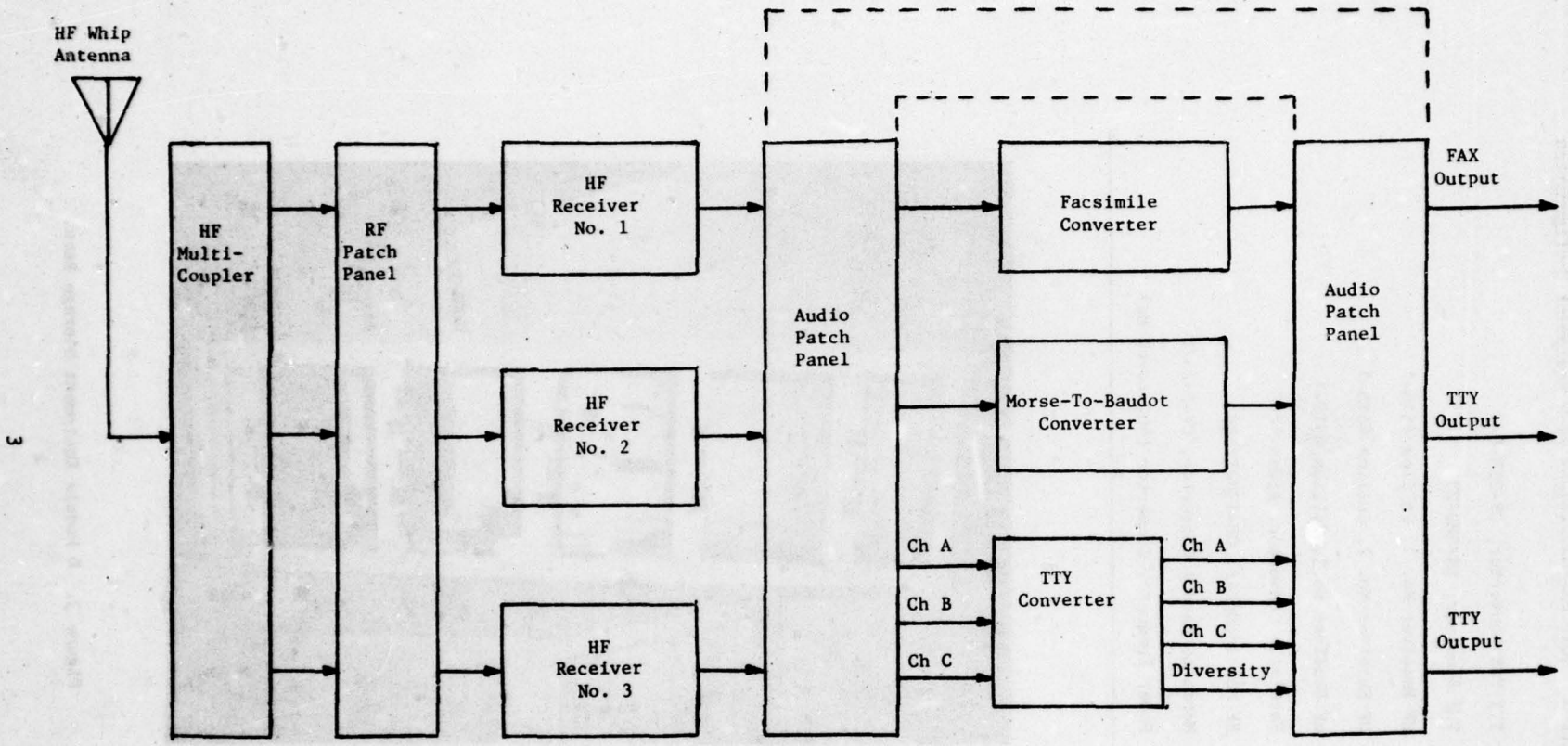

Figure 2. TWAC HF Radio Intercept Configuration

Table 3. TWAC Communications Rack Equipment Configuration

1. TTY FSK Convertor, CV-2543P/T
2. VHF Receiver, AN/SMQ-28
3. HF Receiver No. 1, Collins 651S-1
4. HF Receiver No. 2, Collins 651S-1
5. HF Receiver No.3, Collins 651S-1
6. Facsimile Convertor, Alden 421C
7. HF Multicoupler, CU-1382F/FRR
8. Morse-to-Baudot Convertor, CV-2124/U
9. Power Frequency Convertor (400-to-60 Hz)

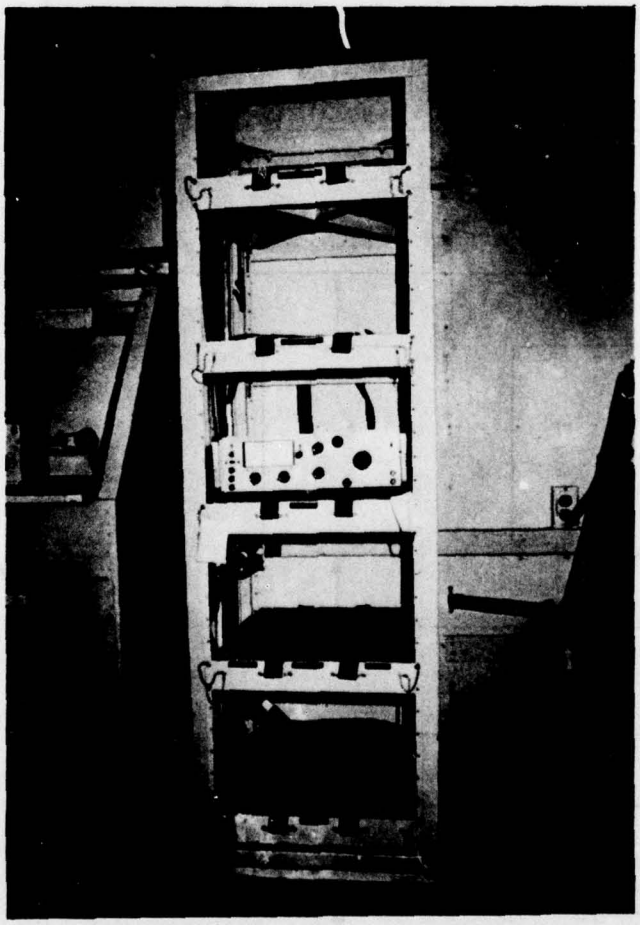

Figure 3. D Module Equipment Storage Rack.

The signals from the equipment are distributed through an audio patch panel in an adjacent rack. The VHF receiver, Morse-to-Baudot convertor, and power frequency convertor are not required for a TABWE HF intercept capability. The power frequency convertor is needed in the TWAC since the TWAC is powered by 400 Hz generators and some of the equipment requires 60 Hz power. The TABWE is designed to be powered by 60 Hz generators so no frequency conversion is necessary. Figure 2 is a functional block diagram of the HF intercept portion of the communications rack.

A prototype HF intercept capability was constructed using one of the test equipment storage racks in the D Module of the TABWE and assets from the communications rack in the TWAC. The equipment storage rack, with its removable shelves is shown in Figure 3.

Sufficient space is available elsewhere in the shelter for storage of test equipment displaced by the new communications rack.

Of prime importance in the prototype installation was the avoidance of permanent modifications to the vans, since any operational installation must also be done without modification. Meeting this objective meant avoiding changes in the existing signal entry panel and power distribution system. No changes in the panel or power system are required if existing jacks and receptacles are used for signal lines and power requirements. The TABWE "D" Module signal entry panel is shown in Figure 4. The two jacks on the top row are BNC types, and the two jacks at the bottom left are N types. These four jacks are unused and terminate with similar connectors inside the van. One of the N type connectors could be used for connecting the cable from the antenna. One of the BNC jacks could be used for egress of the signal line from the facsimile convertor. Since the output of the TTY convertor is bipolar, the remaining two jacks could be used for signal egress, however another way which avoids the need for special cables would be to use ordinary field wire for both the facsimile and TTY outputs and route the wire through the drain hole in the van. Power for the new communications rack can be obtained from a 20-amp convenience outlet located just to the right of the rack. Thus, no wiring changes or alterations to the power distribution panel are required.

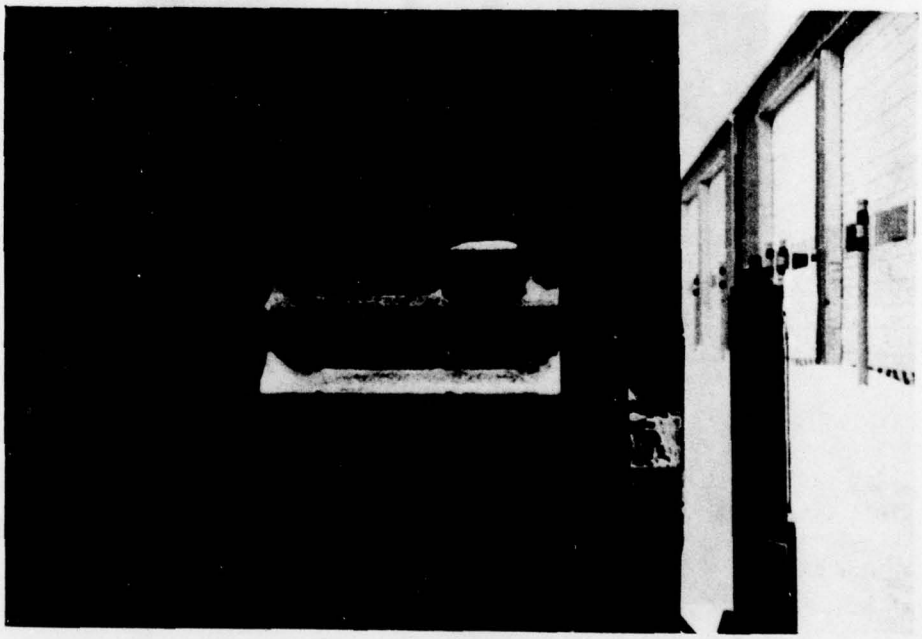

Figure 4. TABWE D Module Signal Entry Panel

The prototype installation is shown in Figure 5. The prototype occupied only about one-half of the total available rack space, since the VHF receiver, Morse-to-Baudot convertor, and power frequency convertor are not required. A permanent operational installation would include a small audio patch panel. A functional block diagram of the new configuration is shown in Figure 6.

5. CONCLUSIONS AND RECOMMENDATIONS. The prototype installation established that an HF intercept capability can be provided in the D Module of the TABWE with no extensive changes to the van. Equipment for the prototype was mounted on spare equipment shelves. A permanent installation would require that several holes be drilled and tapped in the rack for mounting slide drawers and the supporting metalwork. Finally, the 3CMBTCG would prefer to use a whip antenna similar to the one used in the TWAC, rather than something more complex such as the AN/GRA-4 antenna. Mounting a whip antenna to the exterior of the D Module would require four holes for the mounting bracket.

Considering the minor nature of the required alterations, installing the equipment in the D Module of the TABWE appears to be the easiest and most convenient solution to the problem of providing an HF intercept capability for the TABWE.

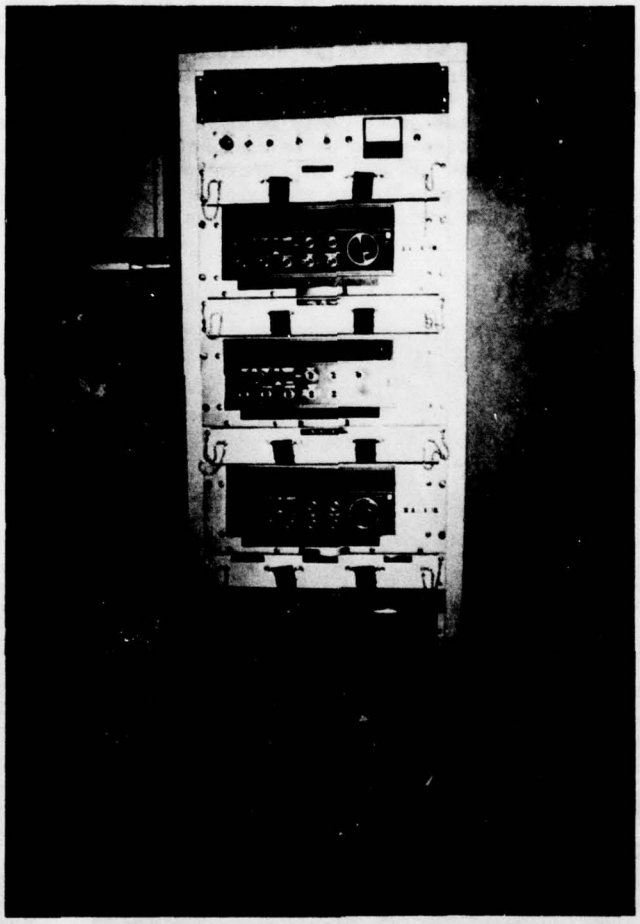

Figure 5. Prototype HF Intercept Capability for the TABWE

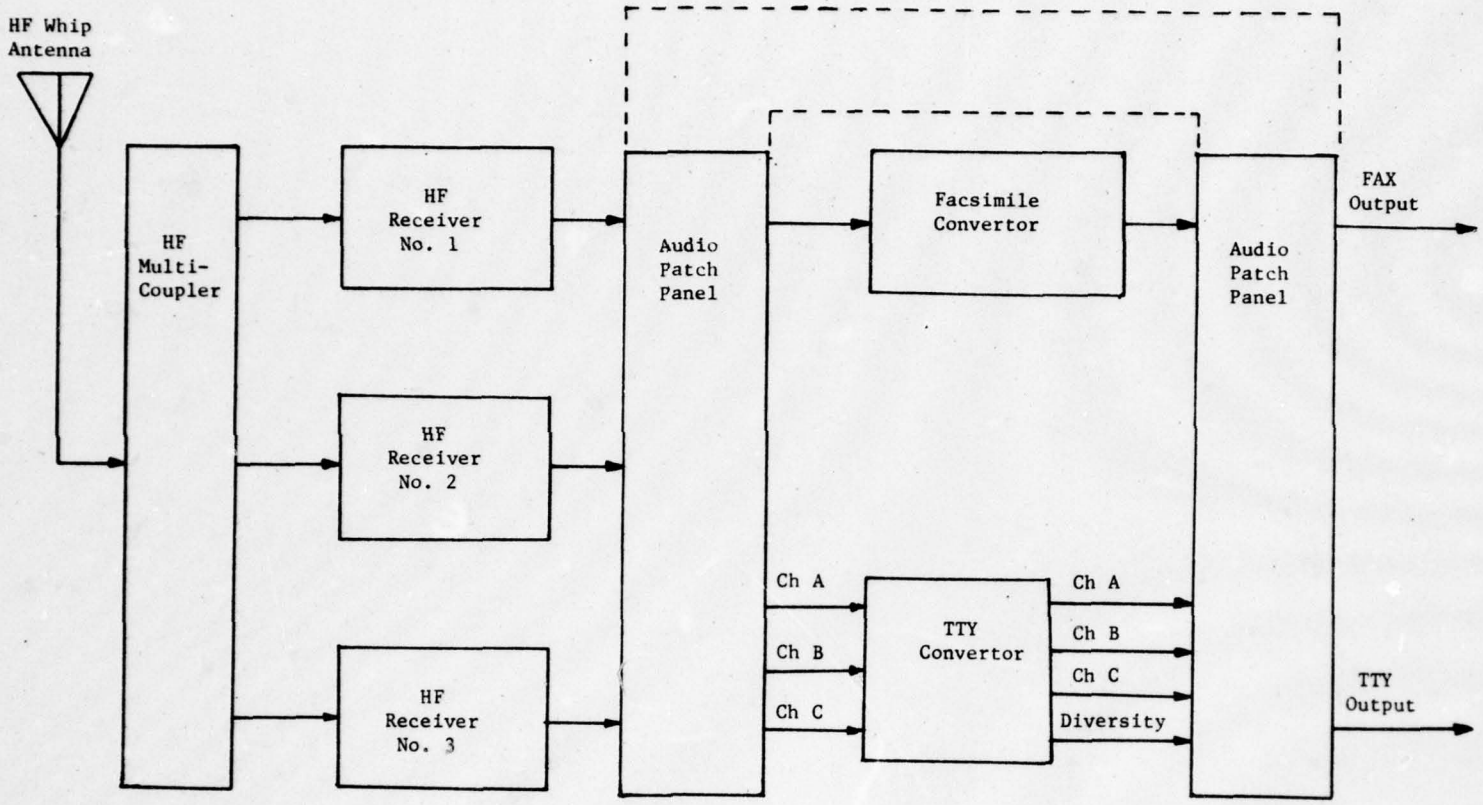

Figure 6. Proposed HF Intercept Capability for the TABWE

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